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PROCESSED EGG PRODUCTS: A MARKETING OPPORTUNITY

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## PROCESSED EGG PRODUCTS: A MARKETING OPPORTUNITY

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Changes in the composition of the population and shifting demand patterns have led to a substantial shift from the more staple items to processed convenience foods that offer economy and built-in service. Processed egg products have participated in this trend. Further development of the market for processed egg products may be an opportunity to offset the long-term downtrend in per capita consumption of shell eggs.

Shell egg consumption has been declining for a variety of reasons. However, many of these same factors provide potential opportunities for processed products. Changes in work and living habits have been important. Because fewer people are engaged in strenuous work, there is less demand for a heavy breakfast than in previous years. An increase in the proportion of married women working outside the home has reduced the amount of time available for preparing meals. More meals are now eaten out in restaurants, snack bars, and school lunch facilities. Also, more people are weight conscious than in the past, and many have become concerned about the effects of various kinds of foods on health. In addition, highly advertised breakfast cereals have offered increasing competition for eggs, particularly among children and young people.

Total egg consumption has remained about stable, except for a gain in 1967. Therefore, per capita consumption of eggs has decreased. A significant aspect has been the decline in consumption of shell eggs and the increase in consumption of egg products (table 5). In the past 15 years, per capita consumption of shell eggs declined 19 percent; consumption of processed egg products increased 36 percent.

Only about 10 percent of the eggs produced in this country are processed into liquid, frozen, and dried form. Trade sources indicate that processing may account for 25 to 30 percent of eggs produced by 1975. 2/ Even if this projection is optimistic, there could still be a rapidly expanding potential market for egg products. Even a conservative estimate of future consumption would result in a market of well over 1 billion pounds of processed egg by 1980 with a wholesale value of \$300 million or more (table 8).

### Industry Structure

The egg processing industry is diverse, operating in many areas of the country. Approximately 160 plants freeze or dry liquid egg on a commercial scale while 400-500 smaller plants salvage eggs through breaking operations. Many drying plants were established during World War II, but most of these plants have since closed. Not more than 30 plants produce dried egg today, and nearly all of them also produce various other liquid and frozen products. Most of the egg processing plants are small breaking operations with no drying or other processing facilities.

Most egg-breaking firms are in the Midwest, although an increasing number of new plants have been set up in the South and West in recent years. The breaking industry traditionally acts as a buffer and removes shell eggs from the market when prices are low and surpluses burdensome. During seasonally high spring production periods, Midwestern plants often compete directly with firms selling shell eggs for their supplies. Newer plants in other regions depend almost entirely on surplus eggs and other eggs not in demand for table use.

1/ The author is stationed at the College Experiment Station, University of Georgia, Athens, Ga.

2/ Halverson, Florence, "What's the Future of Egg Products?" Poultry Tribune, Vol. 73, No. 11, November 1967.

Table 5.--Per capita consumption of shell and processed eggs, 1954-68

Year	Egg consumption			Proportion of eggs processed
	Shell	Processed <u>1/</u>	Total	
	Number	Number	Number	Percent
1954 .....	351	25	376	6.6
1955 .....	346	25	371	6.7
1956 .....	345	24	369	6.5
1957 .....	335	27	362	7.5
1958 .....	328	26	354	7.3
1959 .....	319	33	352	9.4
1960 .....	306	28	334	8.4
1961 .....	298	30	328	9.1
1962 .....	296	30	326	9.2
1963 .....	290	27	317	8.5
1964 .....	287	31	318	9.7
1965 .....	285	29	314	9.2
1966 .....	283	30	313	9.6
1967 .....	289	35	324	10.8
1968 <u>2/</u> .....	284	34	318	10.7

1/ Shell-egg equivalent.2/ Preliminary.

Egg-breaking and processing firms are typically low-margin, high-volume operations. Seasonality of production can affect profits greatly. Some processors have experimented with large scale procurement programs in an attempt to control quality characteristics and assure a longer season or more stable year-round supply of raw material.

Yolk color has always been a problem for egg processors. Food manufacturers and bakeries often require eggs that have specific color and emulsifying properties. Long standing difficulties with salmonella and other pathogenic organisms has led to mandatory pasteurization of egg products; this has added considerably to plant investment and operating expense.

#### Processed Egg Products

The principal processed products are plain whole eggs, mixed whole egg blends, albumen, plain yolks, sugared and salted

yolks, and various other yolk and albumen combinations. Plain whole eggs are a mixture of whites and yolks in natural proportions containing a minimum of 24.7 percent solids. Mixed whole eggs are a blend of whole eggs with extra yolk, sugar, salt, or syrup added according to a pre-determined formula. Whole eggs, both plain and mixed blends, account for about half of all processed eggs (table 6).

In terms of volume, albumen and albumen products are next in importance, accounting for about 26 percent of the processed market. Albumen products have traditionally had more limited uses than yolks or whole egg blends, and in the past, supplies have often been burdensome. Substantial quantities of albumen are sold in dried form. The term "egg solids" is often used interchangeably with dried eggs.

Table 6.--Production of processed egg products by type of product, 1968

Type of product	:Whole egg :and blends :	: Albumen	:Plain yolk :and blends :	: Total	: Share of : production
	- - - - 1,000 pounds - - - -				<u>Percent</u>
Frozen .....	203,757	67,263	89,586	360,606	53
Dried <u>1/</u> .....	125,364	99,699	28,116	253,179	38
Liquid .....	37,608	11,661	13,697	62,966	9
Total .....	366,729	178,623	131,399	676,751	100
Percent of total production .....	54	26	20		100

1/ On a liquid equivalent basis, ingredients added.

Data from Egg Products: Frozen, Solids Production, Pou. 2-5. (1-69) Statistical Reporting Service, USDA, January 29, 1969.

Plain yolks and blended yolk formulations account for about 20 percent of the processed egg market, but these products are more valuable and have a greater variety of uses than albumen. Sugared or salted yolk combinations are most common. They consist of a minimum of 43 percent solids plus 10 percent sugar or 10 percent salt. Specialized blends with dark yolk color usually command a substantial price premium.

#### Production and Uses of Various Product Forms

Frozen Eggs: Frozen eggs account for well over half of the production of processed egg products. Frozen whole eggs or whole egg blends are currently the largest single component of the egg products market. However, many yolk products are also sold in frozen form. Large quantities of frozen eggs are used by the baking industry, institutional outlets such as hospitals, hotels, and restaurants, and a variety of other food manufacturers producing baby foods, mayonnaise, noodles and macaroni, and other products (table 7). Production of frozen eggs is declining relative to

the production of dried eggs and liquid eggs for immediate consumption. Various trade sources estimate that frozen eggs may drop to only 15 or 20 percent of processed egg production by 1975. 3/

Liquid Eggs: Fresh liquid eggs currently constitute less than 10 percent of processed egg production. Over half of the liquid eggs is sold as whole eggs or mixed whole blends. Albumen and yolk products account about equally for the remainder of sales. Substantial quantities of liquid eggs are used by confectionery firms and candy makers. Many large food manufacturers are now using substantial quantities of liquid eggs.

In recent years, many bakeries and large institutions that traditionally used frozen eggs have shown a renewed interest in liquid products. This could provide a greater market for liquid eggs as improved handling methods are devised.

The market for liquid products is expected to increase significantly over the next few years as additional large users adapt their operations to handle this product which can be transported

3/ See footnote 2.

Table 7.--Proportions of processed egg products used by selected food manufacturing industries 1960 1/

Type of product	Bakeries	Premix manufacturers	Confectionery firms	Miscellaneous food manufacturers <u>2/</u>
	<u>Percent</u>			
Frozen .....	80	--	27	60
Dried .....	13	100	4	3
Liquid .....	5	--	63	3
Shell .....	2	--	6	34

1/ Based on survey of food manufacturing industries, MRR-608, Present and Potential Use of Egg Products in the Food Manufacturing Industry, ERS, USDA, June 1963, p. 4.

2/ Includes manufacturers of noodles, macaroni, and ravioli; salad dressing and mayonnaise; meat and fish products; baby foods; and specialty items.

directly from producing areas in tank trucks. Lower handling costs and savings on transportation are the primary advantages of using liquid egg. They also have less physical breakdown and improved flowability characteristics resulting from omission of the freezing process.

Dried Eggs: Dried egg solids constitute over one-third of the processed egg market. Production of egg solids has increased steadily since the early 1950's, when dried egg was at its low point after the enormous demand stimulated by the price support program of World War II. Solids production is more concentrated in albumen and whole egg and blends. Recent technical improvements in anticaking agents have improved the flowability of reconstituted dried whole egg and yolk products. These developments might help to increase the future use of egg solids by the baking industry. 4/

Large quantities of dried eggs are used by bakeries and the premix industry in manufacturing cake and pie mixes, doughnut mixes, and dessert specialties.

Bakeries and other large food manufacturers are reportedly using larger amounts of egg solids than they have in previous years, due to improved product characteristics and increased economies and convenience in handling. Trade sources estimate that egg solids will gradually become the most important type of processed product. By 1975, egg solids may account for as much as 50 percent of processed egg production.

#### Market Potential

Egg production is a \$2 billion a year business for U.S. farmers. Processed eggs are a small but growing segment of this market. In 1968 over 500 million dozen eggs were used to produce more than 670 million pounds of processed egg products. These eggs had a wholesale market value of about \$160 million (table 8). With expanding population, increasing levels of income, and greater desire for convenience foods, sales of egg products could increase rapidly.

4/ Kahlenberg, Orme J., "Recent Developments in the Egg Industry," Bakers Digest, Vol. 41, No. 5., October 1967.

Table 8.--Processed egg products: Production, price, and wholesale value, 1954-68, with projections to 1980

Year	Eggs used for processing	Production of processed eggs	Wholesale price of frozen whole eggs	Estimated value of processed products
	Mil. doz.	Mil. lb.	Ct. per lb.	Mil. dol.
1954.....	363	466	28.4	132
1955.....	353	453	31.7	144
1956.....	362	465	30.9	144
1957.....	370	475	27.5	131
1958.....	365	481	30.2	145
1959.....	533	701	26.0	182
1960.....	442	582	27.9	162
1961.....	482	635	30.4	193
1962.....	482	635	27.7	176
1963.....	446	587	26.8	157
1964.....	500	659	26.0	171
1965.....	478	629	25.7	162
1966.....	472	621	31.8	198
1967.....	609	802	24.7	198
1968 <u>1</u> /....	514	677	23.8	161
1970 <u>2</u> /....	645	850	25.0	212
1975 <u>2</u> /....	790	1,040	25.0	260
1980 <u>2</u> /....	964	1,270	25.0	318

1/ Preliminary.

2/ Projected by author.

Data on production compiled from Agricultural Statistics, 1967; current estimates from Egg Products, Liquid, Frozen, Solids Production, Statistical Reporting Service, USDA. Price data from annual summaries of Dairy and Poultry Market Statistics, Consumer and Marketing Service, USDA.

Transforming whole eggs into various blends of liquid and solids content for use in final products is a complex process. Whether used by bakeries or by food manufacturers, the technical problems in developing products with the specific characteristics needed are formidable. Quality characteristics of egg products can be classified into the following general groups: 5/

- (1) Chemical composition and nutritive value
- (2) Unnatural components and additives
- (3) Sensory properties
- (4) Microbiological composition
- (5) Functional properties

All of these factors can affect the market demand for processed egg products, even though functional properties have

5/ See C.F. Saunders, World Poultry Science Journal, Vol. 20, No. 4, pp. 269-276, April 1964.

generally been recognized as being most important. For example, bakeries want products of uniform color, acidity, and beating time. Other processors are concerned with flowability, viscosity, emulsification or leavening properties, and foaming and whipping qualities. On the other hand, sensory properties would be most important in convenience products.

Egg products are sold mainly to commercial food manufacturers and institutional food firms with relatively small amounts sold to consumer markets and industrial outlets.

Because processed eggs have certain unique properties, they are needed in food manufacturing, even if only as a small proportion in many ingredient mixes. The demand for processed eggs in such uses is relatively inelastic with respect to price in the short run. Substitutes are available for some uses, but only long-run price changes are likely to affect the mix formulation. There is some evidence that substitutes are being used more frequently than in the past. <sup>6/</sup> Bakeries, candy makers, and large institutions have used substitutes such as soy albumen, lecithin, and gelatins of various kinds. Other companies have substituted fresh shell eggs for processed products, but this is not usually feasible where convenience in handling, specific product characteristics, shelf life, and cost are important. On the other hand, substitution of processed products for fresh eggs is a strong possibility in certain segments of the consumer and institutional markets due to the increasing demand for convenience foods.

The egg product industry may have a significant potential in the consumer market. A number of large companies

and educational institutions are developing new egg products for the consumer market. Some of the products for the consumer market are items where eggs are combined with fruit juices or other foods to prepare such products as combination juices, omelets, scrambled eggs, egg salads, and french toast. Some of these items are dried and can be quickly reconstituted; while others are frozen and can be heated in the family toaster. Many food companies that have considered marketing processed egg products, however, do not have the technical capability or experience of specialized egg processing firms. On the other hand, many egg processors have been content to supply intermediate users and manufacturers with the raw material needed for end-products not recognizing the opportunity in convenience foods.

Markets for eggs in nonfood products also may be further developed. Eggs for industrial use include inedible and substandard quality products which are used in leather tanning, photography, adhesives, and as a color fixing agent in certain textile processes. Some eggs are also used for medical experiments and in the production of vaccines. Considerably greater quantities have been used in pet foods, fertilizers, and animal feeds. There are also technical possibilities of using egg products in other industrial or chemical processes.

Export markets for processed egg products are another potential outlet, although U.S. shell egg exports have been declining in recent years. Development of new or improved products could open up foreign markets for aggressive manufacturers and processors able to meet quality and sanitation standards. <sup>7/</sup>

<sup>6/</sup> Enochian, R.V., and R.F. Saunders, Present and Potential Use of Egg Products in the Food Manufacturing Industry, MRR-608, ERS, USDA, June 1963.

<sup>7/</sup> The importance of these standards is revealed in a report by R.V. Enochian, "How Europe Rates U.S. Egg Products," Poultry and Egg Situation, PES-225, ERS, USDA, May 1963.





